DOCUMENT RESUME

ED 113 546 CE 005 084

AUTHOR Mangum, Garth L.
TITLE Adjustment to Technological Change: Summary and Policy Implications.
INSTITUTION National Science Foundation, Washington, D.C. Office of National Research and Development Assessment.
NOTE 21p.; For the complete study and its annotated bibliography, see CE 005 082-083

EDRS PRICE MF-$0.76 HC-$1.58 Plus Postage
DESCRIPTORS Employment Projections; Government Role; *Manpower Utilization; *Policy; *Technological Advancement; *Vocational Adjustment

ABSTRACT

A supplement to the report on adjustment to technological change, the document reviews policies of recent years related to adjustment to technological change and the added implications of the Blair and Fechter studies ("Mechanisms for Aiding Worker Adjustment to Technological Change" by Larry M. Blair and "Forecasting the Impact of Technological Change on Manpower Utilization and Displacement: An Analytic Summary" by Alan Fechter). The author concludes that, despite concern generated by the unemployment issue at the beginning of the 1960's, little was done through public policy to aid worker adjustment to technological change. Displacement, rather than neglect, was viewed as the economic and social malady; whether the displacement had technological or other roots was incidental. However, considerable progress was made on behalf of displaced and unplaced individuals during the Manpower Decade, 1960-70. Reviews of post-1965 literature on worker adjustment to technological change by Blair and Fechter further support the fact that technological change is just one of the factors determining future manpower requirements. Fechter feels that, given the general mobility and adaptability of the United States labor force, improvement of forecast methodology is not a high priority need. Nine recommendations related to the issue conclude the report. (EA)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED113546

ADJUSTMENT TO TECHNOLOGICAL CHANGE:

SUMMARY AND POLICY IMPLICATIONS

by

Garth L. Mangum

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

CE 005 084

A

Contribution to the

Final Report

on

NATIONAL SCIENCE FOUNDATION

DA39438

2

This report was prepared under the auspices of a grant from the National Science Foundation, Office of National R&D Assessment. Opinions expressed are those of the author and do not necessarily represent the official position or policy of the National Science Foundation or of the University of Utah.

ADJUSTMENT TO TECHNOLOGICAL CHANGE: THE POLICY IMPLICATIONS

A publicly supported review of the "state of the art" in adjustment to technological change must have as its ultimate concern an assessment of the implications for policy change. Therefore it is useful to review briefly the policies of recent years and the added implications of the Blair and Fechter studies.

Manpower Programs and Technological Change

At the beginning of what has been called the Manpower Decade--the 1960's--it was widely assumed that displacement from technological change was a major factor in the unemployment which had been rising persistently during the years following the Korean conflict. The Manpower Development and Training Act of 1962, the first of a long line of manpower legislation, had as one of its primary objectives the retraining of those whose skills had been made obsolete by technological change. As it turned out, the extent to which those who were unemployed were the direct victims of technological change had been exaggerated.[1] As unemployment dropped from its 1961 recession peak of 6.7 percent to a plateau of about 5.7 percent during 1962 and 1963, the experienced and skilled workers among the unemployed tended to be rehired, leaving behind a residue of inexperienced youth and those marginal workers who had never attained substantial skills.

[1] Technology and the American Economy, Report of the National Commission on Technology, Automation and Economic Progress, Washington, Government Printing Office, January 1966, Vol. I

The exceptions were industries in isolated areas such as coal mining and agriculture where few alternative sources of employment were available. Even there other forces than the direct impact of technological change were involved. For instance, there had been significant technological change in coal mining, but it probably delayed rather than accelerated the decline in unemployment. The immediate cause was the decline in coal consumption which in turn was a consequence of development of sources of cleaner and cheaper fuels--a technological change in itself.

Despite the minimal impact of technological change as a direct incentive for manpower programs, all of the underlying factors involved in the problems which the programs were designed to ameliorate had some technological roots. The process of economic development was moving on to an advanced stage of industrialzation which some thought sufficiently new to merit the term'postindustrial'. Just as the production and distribution of manufactured goods had taken over from the production of foods and fibres as the central thrust of the economy, personal services and information processing were now the cutting edge of development. Economic attention had shifted from natural resources to capital resources to human resources.[2]

In a shorter time frame, the manpower demands of the Second World War brought seemingly irreversible change to U.S. labor markets, much of it technological.[3] Within months, the nation moved from a prolonged depression with high unemployment to the tightest labor markets ever recorded. With

---

[2]Sar A. Levitan, Garth L. Mangum and Ray Marshall, Human Resources and Labor Markets, New York: Harper and Row, 1973, Ch. 1.

[3]Garth L. Mangum, The Emergence of Manpower Policy, New York: Holt, Rinehart and Winston, 1969.

ten or eleven million prime age males leaving the civilian labor force to fight, they had to be fed and armed, our allies fed and armed and our civilian population supported. The pace of rural to urban migration was stepped up, with manpower replaced by more capital equipment and better seed and fertilizers. Agricultural productivity blossomed from its previous rise of one percent per year to 6 percent. And in the postwar period that annual improvement in productivity continued to average five percent. The result, with agricultural consumption rising only two percent each year, was displacement of some three percent of the agricultural work force annually. Some with good education and skills "made out" well on the urban setting. Others became the residents of the central city ghettos. Still others remained where they were as the rural non-farm poor.

Given the tremendous production challenge, energetic efforts went into improving productivity. Improved technology was only one of the factors in the shift from about two percent per year to three percent per year in the pace of output per manhour in the total economy between the pre- and post- World War II periods. A permanent increase in female participation rates was another consequence. After the war, ten years of high birth rates and a new emphasis on education as a prerequisite to employment were other factors in labor market change.

The rural to urban shift continued, now involving to a large degree rural blacks and other minorities. It was in effect, a new immigration and its causes and consequences were to a large degree technological. The old immigration was one of poor rural European peasants moving to U.S. cities, searching out the cheapest housing in the older central cities and finding there unskilled and semi-skilled jobs in the same neighborhoods. The new

immigrants were likewise rural and poor. They too headed for the cheap housing in the older central city slums. But now the jobs were no longer there. The new technology demanded continuous process industry which in turn required open space and favorable tax rates. The more experienced and technically trained workers had also been attracted to the suburbs by the federal housing programs and the automobile. Two-thirds of the industrial capacity built in the U.S. since the Second World War was built in the suburbs. The technology was also affected by rising levels of education. Because educated workers were available, the engineers designing the new technology assumed the education and created a technology which demanded it.

The new immigrants were thus triply disadvantaged. Economics limited them to central city housing and, where it did not, racial discrimination in housing did. Transportation systems were designed to carry white, white collar suburbanites to their downtown jobs, not black (and other minority) central city residents to suburban jobs. Central city jobs available to the undereducated tended to be limited to low level service jobs in restaurants, hotels and office buildings. Meantime, rising agricultural productivity continued to push out-migration while income differentials attracted it. Major developments such as the cotton picker had wholesale effects. Even the number of migratory farm workers needed persistently declined.

Thus, it can be said that high 1947-57 birth rates (which flooded the labor markets during the 1960's and into the 1970's), racial discrimination and technological change were prime factors which contributed to the unemployment from which the political support for manpower programs

emerged. How many were employed was a function of the youth influx, the rising labor force participation rates of women, and technological change, as confronted by the pace of economic growth and job creation. Who were the unemployed was affected by relative education, skill, experience, social and ethnic biases and location. Technological change may also have contributed to a trifurcation which allocated the intellectually oriented jobs to the educated, placed the productive and well paid manual jobs in the hands of unionized, predominatedly white suburban workers and left to the employed poor a residual of lowly paid, dead end service jobs expensive to automate or not worth the investment.

Public policy efforts to aid adjustment to technological change was limited to manpower programs designed to aid those who were at a disadvantage in competing for jobs. Even for these programs, adjustment to technological change was only one of several motivations. Though the initial manpower program, MDTA, emerged ostensibly to adjust to the displacements of technological change, there is no way of ascertaining the role of manpower programs over time in aiding such adaption. Manpower program eligibility is based on unemployment, underemployment and poverty, not upon the causes of these phenomena. Among them would be those displaced by technological changes, those who are victims of changing economic conditions and those who had never found a niche in the labor markets to be displaced from. Where an individual or group of workers are displaced by technological change and become eligible for manpower programs, they must compete with all other eligibles for the limited number of "slots" in federally funded programs.

Among available programs are those which offer skill training and

remedial basic education, those which provide subsidized temporary employment and those which offer some low level work experience accompanied by a stipend. Skill training is limited by budgets to those occupations for which training can occur in about thirty weeks. Concern for the poor and competitively disadvantaged has placed the emphasis in subsidized employment programs on entry level jobs. Work experience programs provide minimal income support and little likelihood of access to improved employment opportunities. In general, therefore, workers displaced from low level agriculture or unskilled work may find in manpower programs a useful adjustment mechanism leading to equal or improved employment status. For workers high up the skill ladder, something more than the usual manpower program offering would be necessary if the adjustment was to be anything but downhill.

The manpower programs contributed to the welfare of their participants.[4] On the average, those who have enrolled in these programs have emerged with higher incomes and steadier employment. But they have generally progressed from just below to just above the poverty line. The programs have never been sufficient to make the breakthrough for large numbers from the secondary labor market into the primary labor market of skilled, productive, well paid, and protected and stable jobs--those jobs which, by and large, have profited from technological change.

Something more is possible and has been done, though rarely. When shifts in national priority displaced thousands of aerospace engineers, MDTA was used to provide high level skill training to update and "retread"

---

[4]Garth Mangum and John Walsh, A Decade of Manpower Development and Training, Salt Lake City: Olympus Publishing Company, 1973.

them and the Emergency Employment Act was used to provide them temporary and "transitional"public sector jobs.[5] The potential exists in manpower programs for a useful adjustment mechanism. It can be exercised only when the displacement is sufficiently of public and political concern to justify and make possible reallocation of limited funds from present routines.

Throughout the manpower program experience, one potential mechanism for manpower adjustment to technological change was noticeably missing from the legislated package of services. When rapid technological change struck the meat packing industry, the widely-heralded Armour Automation Agreement contained among its collectively bargained provisions support for relocation from areas of declining employment to communities with more promising job opportunities.[6] For the plant closings consequent to relocation of industry from North to South in the 1950's and 1960's, provisions for moving people with the jobs were frequent. But these were privately negotiated and supported provisions.

The Area Redevelopment Act of 1961 offered modest support for relocating capital in favor of labor surplus areas. There was no provision for relocating people. When MDTA was first proposed it did contain provisions for relocation assistance, but there was no favorable response in the legislative halls. The notion of using the taxpayers' money to pay a Congressman's constituents (and his constituents' customers) to move

[5]Bureau of National Affairs, Manpower Information Service, "New Aerospace Retraining Funds" April 7, 1971, Vol. 2, #15, p. 35; "15,000 Aerospace Jobless Registered", May 19, 1971, Vol. 2, #18, p. 42; "Fasser Sees Expansion of Effort to Aid Jobless Aerospace Workers", June 9, 1971, Vol. 2, #19, p. 437; "Expanded Job Effort for Engineers", Nov. 24, 1971, Vol. 3, #5, p. 107; "Progress Report on TMRP", Jan. 5, 1972, Vol. 3, #8, p. 176.
and Sar A. Levitan and Robert Taggart, III, The Emergency Employment Act, The PEP Generation, Salt Lake City: Olympus Publishing Co., 1974.

[6]George Shultz and Arnold Weber, Strategies of the Displaced Worker, Harper and Row, 1966.

from his district could not expect resounding support. All that could be won by amendment in 1963 was permission for a pilot project to move limited numbers under carefully prescribed conditions. Those qualified had to be unemployed or underemployed persons for whom their was no reasonable expectation of employment in their own communities. A bonafide job offer had to be available at the destination end of the move and it had to be certified that the job could not be filled from the local labor force.

Some 14,000 workers, screened from among 40,000 eligible persons were relocated between 1965 and 1968, when the authorization was discontinued. They were provided with varying combination of (a) moving expenses, (b) lump sum allowances, (c) temporary dual household subsistence payments and (d) staff support for finding housing, jobs, etc.[7] The relocation assistance was never offered on a blanket basis, but in special pilot projects in areas where there appeared to be a particular need. Moves were rural to urban, slum to suburb, rural to rural and urban to urban. They involved reservation Indians, rural Blacks, and rural Chicanos moving to cities, coal miners and iron miners moving from depleted areas to manufacturing employment, tenant farmers moving to hired farm labor jobs in more prosperous rural areas and displaced aircraft workers moving from New York to California.

The causes for dislocation were for the most part long term decline in the area of origin or changes in government procurement policies as in the aircraft worker case. Few of the dislocations were immediately technological in their origin but most had technological change as an underlying, long term factor. Dislocation of cotton pickers in the South was

[7] Levitan, Mangum, Marshall, op. cit., pp. 539-47.

the most immediately chargeable to technological change. However, whatever the reason, the effectiveness of relocation assistance as an adjustment mechanism was tested. Relatively few of those who were eligible for the assistance could use it because of the restrictions or took advantage of it when offered. However, applying the same ratio of those screened to those who accepted relocation to all of those experiencing unemployment of 15 weeks or longer duration in 1967 would have resulted in relocating 150,000 families. Those who chose to move were generally the most mobile. Some may have moved on their own but not at that time when their need of assistance was evident. One of the great contributions was greater rationality of movement. The unguided tendency was to move where there were kinship ties with those who had previously moved. The tendency was to overload such areas. Moving with Employment Service and other guidance to locations with bonafide job offers tended to move the labor where it was needed. All in all the pilot projects suggested that relocation assistance was a useful adjustment mechanism of moderate contribution to the labor market but major advantages to those who took advantage of it.

Less successful were the programs designed to attract capital to depressed areas with surplus labor.[8] The Area Redevelopment Act of 1961 (ARA) was stymied by a slack economy and a tendency to spread federal funds too thinly in order to buy Congressional support. Its successor, the Economic Development Act (EDA) attempted to impose a growth center philosophy, concentrating efforts and funds upon the most promising centers within a depressed area. However, the causes of spot decline within a prosperous

[8]Niles M. Hansen, Rural Poverty and the Urban Crisis, Bloomington, Indiana: University Press, 1970.

economy were deep-seated and difficult to reverse. Politically it was difficult to choose and restrict attention to limited areas. State governments tended to be more concerned with getting "their share" of the budgets than in cooperating in regional development. Academic thinkers have supplied little insight on how to reverse the decline of a depressed area and make it grow.

The Appalachian Regional Commission appears to have had some success with its educational and health programs and in building roads to open access for entry and exit into some of its more inaccessible areas. Local communities have attracted industry through tax exemptions and other special privileges but that is a self-defeating policy for a whole economy. Beyond the modest Appalachian success which may or may not be a result of the policies and programs followed, programs to bring prosperity to isolated or depressed small economies remain unproven.

In the public employment service, the major public agency aiding the displaced worker, a number of useful innovations occurred. Computerized systems to match job seekers with jobs were experimented with in four states, though not yet approved as a national system. The availability of manpower programs made it possible to refer those who failed to meet employer criteria to sources of employability improvement. Employment staff and the staffs of other manpower programs gained experience in job development. That is, rather than accepting the employer's criteria, staff sought to convince personnel staff in the employing establishment that some of their criteria were irrelevant to productivity or that they should make a social contribution by hiring and training on the job the less

skilled.[9]

Thus one must conclude that, despite the concern generated by the unemployment issue at the beginning of the 1960's, little was done through public policy to aid worker adjustment to technological change. However, neglect was not the reason. The fact is that displacement (or to never have had a place to be displaced from) was the economic and social malady. Whether the displacement had technological or other roots was incidental. Rather considerable was accomplished on behalf of the displaced and unplaced.

The Blair and Fechter Conclusions

At the instigation of the National Science Foundation, Larry Blair and Alan Fechter have reviewed the post 1965 literature on worker adjustment to technological change and summarized the state of the art.[10] Their conclusions differ in no significant way from those of the "Automation Commission" in 1965-66.[11]

According to Blair,"the prevailing view from the literature is that technological change has affected job opportunities and altered needed skills somewhat, but full employment with good job information programs and privately developed mechanisms can handle and have handled the worker adjustment problems quite well in the vast majority of cases." He found in the literature a conviction that special groups--older workers, minorities, women and younger and unskilled workers needed additional adjustment help. However, to this view should be added the continuing conviction

[9] Miriam Johnson, Counterpoint: A Changing Employment Service, Salt Lake City, Utah: Olympus Publishing Co., 1974.

[10] Larry Blair, Mechanisms for Aiding Worker Adjustment to Technological Change, National Science Foundation, Award No. DA39438, 1974. Alan Fechter, Forecasting the Impact of Technological Change on Manpower Utilization and Displacement: An Analytic Summary, National Science Foundation, Report No. 1215-1, March 1974.

[11] Technology and the American Economy, op.cit.

underlying the automation commission findings that it is the fact of displacement or unplacement rather than the technological or other roots of its origins that creates the need for adjustment assistance.

Blair found a concensus that the employees of large scale unionized industries were generally reasonably well protected. Those employed by small establishments or without permanent employment attachments rarely had private protections and most depended upon public programs. The public programs suffer two major deficiencies: (1) they are inadequate in scope--that is their funding and the capacity is too small to absorb all of those needing help-- and (2) the public agencies lack job control--they can improve employability but can not provide employment.

Blair found a general concensus that there was little justification for restrictive work rules and indications that those which had existed had declined in seriousness. Often they have been passed by through further technological change. He found adjustment mechanisms and labor-management negotiations over them not to have retarded significantly the adoptions of technological improvements in the American economy. In part, this may have been because technological change has eroded immediate union bargaining power in several major industries. This has occurred largely through adoption of automatic production equipment which relegates union members to a standby and maintenance role which can be filled in the short run by supervising personnel.

All of this does not mean that concern for adjustment to technological change has gone away. It means that concern has shifted from the economic to the social system. It is no longer the worker displacement phenomenon which frightened observors in the late 1950's and early 1960's.

It is now the impact on society as a whole of invasions of privacy from data processing systems, environmental pollution and machine domination of people's lives. For those threats there must be other protections than those useful for worker adjustment to technological change.

Fechter's findings too echo the conclusions of the automation commission nearly a decade ago. Technological change is just one of the factors which determine future manpower requirements. In fact, expected size, composition and capabilities of the future manpower supply probably has as much impact on the nature of future technology as vice versa. Intelligence on the nature of future manpower requirements is important for economic and education planning and for investment and career decisions. Whether or not the force determining these requirements is technological or other has limited relevance. The question is "can manpower requirements be forecast with reasonable accuracy?" not "can the impact of technological change in those requirements be forecast?" As Fechter points out, this is reflected in the forecasting models in use which first forecast output and then determine the employment implications of that output. For levels of employment, technology enters through its impact on productivity. Technological influences have more to say about the structure of or skill-mix of employment, but it remains a secondary consideration. It is the skill-mix itself rather than the impact of technology on it which is the objective of the forecasts.

Fechter ascribes limited accuracy to forecasts of future skill requirements and notes the lack of regional and local forecasts. Accuracy is, of course, relative to the purpose of the forecast. For some purposes, say the overall need for engineers or physicians, broadly defined, the direction and rough magnitude of requirements may be sufficient. A youth making

a career decision needs no more than that but needs it for the locations within which he prefers to live. Where the concern is for the manpower requirement of a particular program, for example, astro-physicists, greater accuracy may be desired. In general, national forecasts have been able to forecast with considerable accuracy direction of trend and general magnitude. Accuracy costs money as a surrogate for resource allocation. Priority in improvement of forecasting technique should be addressed to improving forecasts for particular geographical areas. Fechter's general conclusion is that, given the general mobility and adaptability of the U.S. labor force, improvement of forecast methodology is not a high priority need.

Conclusions and Recommendations

Recommendations growing out of these state of the art assessments are as modest as the findings themselves and differ only through the perspective of time from those of the automation commission:

1. Since technology's impact is only one of the causative factors underlying the displacement against which it is desired to protect workers, the focus should begin with protection against displacement and work back to the causes only if the protection needed differs according to its source.

2. The seriousness of any displacement differs widely by time of displacement, the employability of the displaced and alternative employment opportunities. Special mechanisms should be available for the competitively disadvantaged at all times and for all who might become displaced in times of economic recession or in places not sharing in general prosperity.

3. Adjustments in the private sector can be left to negotiation between employee organizations and employers. They are the people who

experience the pain and know the costs of alternative remedies. In some cases, resources will be inadequate or relative bargaining power too unequal for accomodation. However, government's knowledge of the attendant intricicies is too limited to intervene in private adjustments. Much better to provide general public protections available to all outside the employing establishment. Thus, for example, the public pension system and unemployment compensation under the Social Security Act can be adjusted rather than intervene in private relationships.

4. Alternative employment opportunities are the essentials for successful worker adjustment to any displacement. The automation commission advocated high general levels of aggregate demand as the major adjustment tool accompanied by a guarantee of employment for those likely to find opportunities adequate only under inflationary conditions. The public service employment concept under the Emergency Employment Act and the Comprehensive Employment and Training Act is a vehicle for an employment guarantee but the level of funding is far too low to generalize the guarantee. There is current danger that use of traditional restrictive monetary and fiscal policies to quelch an inflation which did not originate in the labor market will generate unusually high levels of unemployment before price levels are brought under control. Public policy should be directive enough to solve inflation at its sources. If not those at the lower margins of the labor market who are held hostage to control an inflation they had no part in creating should be indemnified by public service employment and income maintenance programs.

5. Only overall levels of purchasing power can determine how many are employed and unemployed. Who suffers the unemployment is a function of relative competitiveness of the workers and the efficiency and equity of

labor market institutions. Whether impacted by technology or other forces, there are those who suffer more than their fair share of unemployment and low incomes. To some extent, the reasons are inherent in the individuals themselves--lack of education, skill, experience, motivation, health and so forth. To a greater extent the shortcoming is in the institutions of the labor market which are either overtly or structurally biased against certain socioeconomic groups. Equity demands realistic as well as equal access to available opportunity for all. Programs to guarantee that access are most likely to be effective if they are directed at the actual personal or institutional barriers.

6. Employment displacement is not the only penalty imposed by technological and economic changes. Thwarting the expectation of those outside awaiting entry to the labor market and jobs may be equally painful and costly. Adjustment mechanisms should aid the transition from outside the labor force to a job as well as that between jobs.

7. While private adjustment mechanisms can meet the needs of the well-employed at most times and the disadvantaged need priority attention, there will be occasions when public policy must protect the well-endowed. Those are the occasions when public policy is the cause of the displacement. For instance, it was public policy which attracted engineers and scientists to the space race and it was public policy which abandoned them there.Thus a social responsibility for publicly provided adjustment mechanisms.

8. Displacement is an individual and local phenomenon. It is the individual who suffers and does so where displaced and resident. Occasionally adjustment may involve a geographical relocation but most often solution will be found in the resident area. This is in accord with the current

move to decentralize the planning and administration of manpower programs.[12] Adjustment mechanisms should have the local labor market as their focus.

9. The final conclusion is the same as the first. There is nothing sufficiently unique about technological displacement to merit special policies and machinery. The mechanisms needed are those which can aid adjustment, where needed, to all displacement. The "where needed" is an important qualifier. Displacement is ubiquitous but most of it is unnoticed because it is accomodated by alternative opportunities and existing private and public mechanisms. Some pain must be borne by those displaced. Social energy and social wisdom is simply inadequate to take care of all social problems. The obligation is to identify those which will worsen if left to fester, those which impose considerable costs upon the individuals involved, and those which impact upon persons least able to help themselves, then provide policies and programs to meet those identified conditions. The remaining impacts are the costs of a flexible and adaptable economy and labor market.

---

[12] Garth Mangum and David Snedeker, Manpower Planning for Local Labor Markets Salt Lake City, Utah: Olympus Publishing Company, 1974.